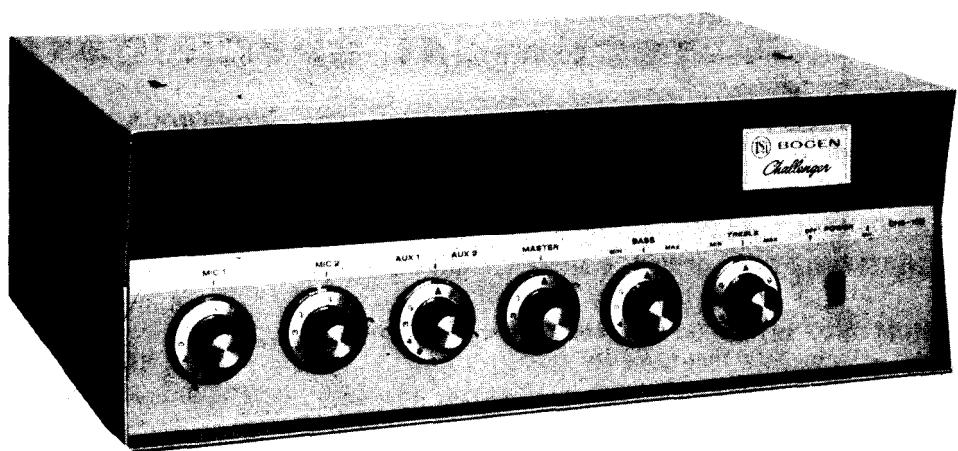


# **BOGEN**

## *Challenger Solid State Series*



### **MODEL CHS100**

100 WATT TRANSISTOR  
PUBLIC ADDRESS AMPLIFIER

LEAR SIEGLER, INC.



BOGEN COMMUNICATIONS DIVISION  
P.O. BOX 500  
PARAMUS, N. J. 07652

**INSTALLATION AND OPERATING MANUAL**  
READ THOROUGHLY BEFORE OPERATING EQUIPMENT

## DESCRIPTION

The Bogen Model CHS100 is a fully transistorized public address amplifier rated at 100 watts. The unit will accommodate two microphone inputs and two auxiliary inputs for a tuner, tape recorder, or phonograph with a ceramic cartridge. The amplifier will accommodate either high or low impedance microphones, and no transformer is required to change from one microphone impedance to the other.

An optional accessory designed to mount on the front panel of the CHS100 provides two additional high or low impedance microphone inputs. A BRIDGING receptacle on the rear panel accepts additional high-level, 'high-impedance signals from a unit having its own volume control, such as a preamplifier, tape recorder or tuner. The BRIDGING receptacle can also be used as a high-impedance output to feed a tape recorder or auxiliary amplifier. The master volume control will not affect the bridging output level.

Individual volume controls are provided for each microphone input. A fader volume controls selects and adjusts the level of the desired auxiliary input and permits fading between the two inputs. A master volume control regulates the mixed output level. Separate bass and treble controls permit adjustments for tonal balance.

Outputs are provided for 2, 8 and 16-ohm speakers and for 25-volt and 70-volt balanced speaker line systems. Two quick-disconnect plugs provide rapid and convenient connections to speakers. The output of the CHS100 amplifier can also be fed to a tape recorder or booster amplifier.

The CHS100 amplifier operates from a 105-125 volt AC source, and has a total power consumption of 150 watts. A 1.75-ampere circuit breaker protects the amplifier against overloads.

## TECHNICAL SPECIFICATIONS

**POWER OUTPUT:** 100 watts at less than 5% distortion.

**PEAK POWER:** 200 watts.

**FREQUENCY RESPONSE:** 40 to 20,000 Hz  $\pm 2$  db.

**SENSITIVITY:** Hi Z MIC, 4 mv; Lo Z MIC, 0.3 mv; AUX, 0.3 volt; Bridging, 1 volt.

**HUM AND NOISE (below rated output):** MIC input, 65 db; AUX input, 70 db.

**INPUTS:** 2 MIC, high (100 K ohms) or low (200 ohms) impedance; 2 AUX (300 K $\Omega$ ); Bridging (high impedance).

**OUTPUTS:** 2, 8, 16 ohm speakers; 25 volt CT balanced (6 $\Omega$ ); 70 volt balanced (49 $\Omega$ ); TAPE or BOOSTER, 10K at 5V; Bridging, high impedance at 0.5V.

**CONTROLS:** 2 MIC volume; 1 AUX volume (fader for two inputs); MASTER volume; BASS, TREBLE tone; POWER switch and indicator.

**TONE CONTROL ACTION:** Treble (at 10 K Hz), +11 db to -12 db, Bass(at 50 Hz), +10 db to -10 db.

**POWER REQUIREMENTS:** 105 to 125 volts, 50 or 60 cycles AC, 150 watts.

**SEMI-CONDUCTORS:** 10 silicon transistors, 2 diodes.

**DIMENSIONS:** 15 $\frac{1}{4}$ " wide x 10 $\frac{1}{2}$ " deep x 5 $\frac{1}{2}$ " high.

**SHIPPING WEIGHT:** 24 pounds.

## ACCESSORIES

### PMA-2 ADD-ON PREAMPLIFIER

The Bogen Model PMA-2 Preamplifier is designed to provide two additional microphone channels for the CHS100 amplifier. Each preamp channel has its own volume control and will accommodate either high-impedance or low impedance microphones. The unit is connected to the Preamp Accessory socket on the top chassis of the CHS100 amplifier. When installed, the PMA-2 control knobs protrude through the front panel of the CHS100 amplifier.

### WMT-1 LINE MATCHING TRANSFORMER

The Bogen WMT-1 line input/line output matching transformer is an accessory which has been designed

especially for matching either inputs from or outputs to a 500/600 ohm line. As an input matching transformer it may be used with the Bogen amplifier for distributing background music which has been transmitted over leased telephone lines. The, accessory also functions as an output matching transformer in feeding special program material over a 500/600 ohm telephone line for transmission to a local broadcast studio.

### LVP-1 ACCESSORY

The Bogen Model LVP-1 is a plug-in accessory which permits the user to provide microphone precedence when used with a customer supplied switch

and the Bogen amplifier. The LVP-1 may also be used as a *remote* volume control in conjunction with the Model RVC-1 remote volume control.

#### RVC-1 REMOTE VOLUME CONTROL

The Bogen Model RVC-1 accessory permits the amplifier to provide remote volume control when used in conjunction with LVP-1 accessory.

#### MODEL LPC-4 PHONO PLAYER TOP

Model LPC-4 is a complete four-speed phono-player designed to be mounted directly on top of the amplifier. The unit comes complete with all necessary hardware, and can be easily installed and connected to amplifier with only a screwdriver. A tone arm hous-

ing a dual-stylus turnover cartridge is included with record player.

#### LK-10 CONTROL GUARD LOCKING PLATE

The Bogen Model LK-10 control guard locking plate is designed to prevent unauthorized tampering with the controls of amplifier. It comes complete with two sets of keys. The key cannot be removed when the lock is in open position.

#### RPK-27 RACK PANEL

The Bogen Model RPK-27 rack panel kit is designed to mount the CHS100 amplifier (with or without the PMA-2 preamplifier) in a standard 19" x 7" rack. The rack panel is finished in gray enamel.

## INSTALLATION

#### UNPACKING

Inspect the shipping container and amplifier for indications of improper handling. The amplifier was carefully checked before leaving factory. If the unit has been damaged, make an immediate claim to the dealer *or* distributor from whom it was purchased. If the amplifier was shipped to you, notify the transportation company without delay and place your claim.

#### CONNECTIONS BETWEEN COMPONENTS

For high-impedance inputs, use single-conductor, low-capacity shielded wire for connecting the record player, tape recorder, and other components to the amplifier. Keep leads under ten feet in length.

For low-impedance microphone inputs, use single-conductor shielded wire, in lengths from 50 to 500 feet depending on the characteristics of the microphone.

Speakers may be connected with standard flexible line cord (zip-cord), and up to 100 feet of cable may be used without appreciable loss.

Make certain that all input cables are kept away from speakers cables, power cables, and power transformers, and that speaker cables are kept away from

power cables.

#### POWER AND GROUNDING

The amplifier is furnished with an AC line cord terminated in a three-prong plug. Plug the line cord into a three-wire grounded outlet providing a nominal 120-volt, 50-60 cycle power source. This will ground the amplifier as well as supply power to it.

It is advisable to ground the amplifier. Therefore, if a three-wire outlet is not available, an adapter such as Leviton No. 5017 should be used to convert a standard two-wire outlet for use with three-wire plugs. The adapter is provided with a grounding pigtail which should be connected to the screw holding the wall plate to the receptacle, as shown in figure 1.

#### NOTE

*In some areas, the wall plate screw is not grounded. In this case it will be necessary to connect a grounding wire between the GND terminal on the rear chassis of the amplifier and a water or steam pipe.*

## INPUT CONNECTIONS

#### MICROPHONES

Two microphones may be connected to the amplifier, and either or both may be used simultaneously. Either high or low-impedance microphones may be used. The amplifier is shipped with an adaptor in the microphone receptacles, which permits high-impedance microphone inputs either from a phone plug or from a standard MCIF microphone connector.

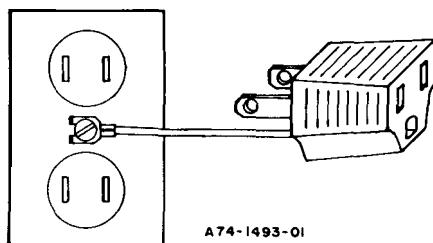


Figure 1 - Grounding Line Cord Adapter

HI Z: Connect a high-impedance microphone (10,000 ohms or more) to the MIC 1 HI Z receptacle on the rear panel of the amplifier (see figure 2). Connect a second high-impedance microphone to the receptacle marked MIC 2 HI Z. Use a single-conductor shielded cable, terminating either in a phone plug or a standard microphone connector (Amphenol 75-MCIF or equivalent). Remove the adaptor from the microphone receptacle when the phone plug is used. The cable length from the microphone to the amplifier should be kept under 10 feet.

LO Z: Connect low-impedance microphones (600 ohms or less) to the LO Z terminal strip on the rear panel (see figure 2). Use a single-conductor shielded cable. The conductor is connected to the MIC 1 terminal and the shield to GND. Connect a second low-impedance microphone to the terminal strip in the same manner, with the high side of the cable to the MIC 2 terminal

and the shield to GND. Low-impedance microphones may be used with cable lengths from 50 to 500 feet, depending on the characteristics of the microphone.

#### CAUTION

*Remove the adapter plug from the microphone receptacle when the low-impedance input is used.*

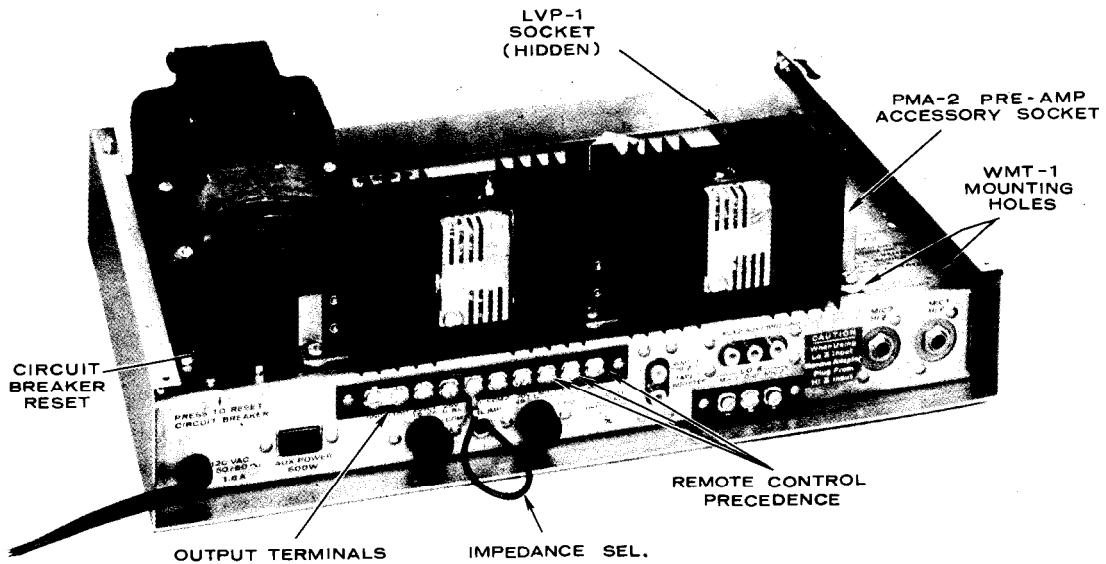


Figure 2 – Rear View CHS100 Amplifier

#### PHONOGRAPH

Phonographs employing a ceramic or crystal type cartridge may be connected to either the AUX 1 or AUX 2 receptacle. Use single-conductor shielded cable terminated in a standard single-prong phono plug. It is recommended that a separate ground wire be connected between the phono player base and the GND terminal on the Output Terminal Strip on the rear panel of the amplifier (see figure 2). This is not required when using the Bogen Model LPC-4 phono player accessories.

#### AUXILIARY

A radio tuner, tape recorder or any other high-level, high-impedance signal source may also be connected to the AUX inputs. An input level of at least 0.3 volts is required to obtain full output from the amplifier.

The input from a 500/600-ohm line is also connected to the AUX receptacle through a WMT-1 line matching transformer. For detailed connections, see the instruction sheet furnished with the Bogen Model WMT-1 accessory.

#### REMOTE VOLUMECONTROL

Each of the three input channels may have its volume controlled remotely by utilizing Bogen LVP-1 and RVC-1 accessories. Remote control permits adjustment of volume from distances up to 2,000 feet.

The LVP-1 unit is plugged into the appropriate REMOTE ACCESSORY SOCKET, located on the top chassis (see figure 3). It is necessary to remove the top section of the amplifier cage to reach the accessory

sockets. This is done by loosening the two sheet metal screws at the rear of the amplifier and lifting the top section off.

The leads from the RVC-1 accessory are connected to the MIC 1, MIC 2 or AUX terminal and GND on the REMOTE CONTROL PRECEDANCE strip on the rear panel (see figure 2). Complete installation information is contained in the instruction sheet furnished with the LVP-1 and RVC-1 accessories.

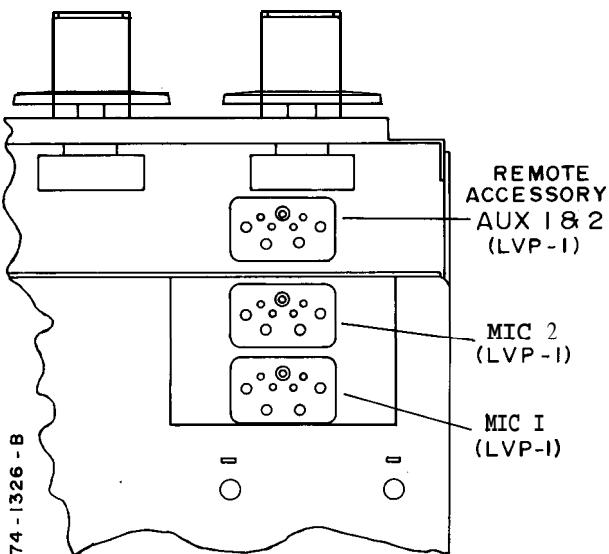


Figure 3 – Location of Accessory Sockets

## MICROPHONE PRECEDENCE

Each of the microphone channels can be connected to provide precedence over the AUX channel by means of the Bogen LVP-1 accessory unit and an ordinary single-pole, single-throw switch. The LVP-1 accessory is plugged into the AUX REMOTE ACCESSORY socket on the top of the chassis (see figure 3). Connect the switch to the MIC 1 or MIC 2 terminal on the REMOTE CONTROL PRECEDENCE strip on the rear panel (see figure 2). For complete installation information, see the instruction sheet furnished with the LVP-1 and RVP-1 accessories.

## WMT-1 ACCESSORY INPUT

To connect the input from a 500/600-ohm line, mount the WMT-1 transformer on the WMT-1 mounting holes on the rear chassis (see figure 2). Connect the 500/600-ohm input to the three-screw terminal board on the accessory. Connect the phono plug on the WMT-1 to the AUX 1 or AUX 2 input of the amplifier.

## NOTE

*If another sound source has been plugged into the AUX input, the WMT-1 may be connected to the MIC input of the amplifier. However, the WMT-1 wiring must first be modified, as described in the instruction sheet furnished with the accessory.*

## AUXILIARY POWER

The auxiliary power receptacle is a three-wire grounded outlet. Hence, any associated equipment connected to it with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded. Both the amplifier power switch and the phono on-off switch must be used in turning off a recordplayer connected to the auxiliary receptacle. Flats may develop on the idler wheel of the phonograph if only the amplifier power switch is used to stop the record player.

# OUTPUT CONNECTIONS

## SPEAKERS

The amplifier may be used with speaker systems rated at 2, 8 and 16 ohms and with 25-volt and 70-volt constant-voltage speaker systems. For detailed information on the installation of multiple speaker systems, refer to the Speaker Installation Instructions (No. 54-5001-02) included with this unit.

In installations where speakers will remain connected to the amplifier permanently, connect the speaker directly to the output terminals on the rear panel (see figure 2). Connect one lead to the terminal corresponding to the speaker system's impedance and the other lead to COM 1.

For 25-volt operation, connect leads between 25 V (6-8 Ω) terminal and COM 1. For balanced 25-volt operation, remove the shorting link between COM 1 and GND. Connect the high sides of the balanced line between the 25 V (6-8 Ω) and the COM terminals. The balanced line ground is connected to the 25 VCT (1.5-2 Ω) terminals.

For 70-volt operation, connect the speaker line leads to the 70 V (4912) and COM 2 terminals. Connect a jumper between the COM 2 and GND terminals, if grounding is desired. For balanced line operation, disconnect the jumper between COM 2 and GND.

For installations that are moved constantly, connect the speaker to the speaker socket on the rear panel. Two speaker plugs (Bogen Part No. 85-0147-01) are furnished with the amplifier for use in making connections to the speaker sockets.

For standard impedance loudspeakers and 25-volt systems, connect the speaker line leads to pins 1 and 2 of the plug. Connect the wired plug to either speaker socket, then attach the impedance selector to the appropriate output terminal which corresponds to the impedance of the loudspeaker. For 25-volt systems, the impedance selector is attached to the 25 V (6-812) terminal.

For 70-volt operation, the speaker line leads are connected to pins 2 and 3 of the speaker plug. Connect the impedance selector to the COM 2 terminal.

## BRIDGING OUTPUT

The BRIDGING receptacle on the rear panel provides a high-impedance output to feed a tape recorder or auxiliary amplifier. The MASTER Volume Control will not affect the bridging output level.

## WMT-1 ACCESSORY OUTPUT

By utilizing a Bogen WMT-1 bridging transformer, a zero-level output at 500/600 ohms may be obtained for feeding a telephone line. The WMT-1 accessory is connected to the WMT-1 HI Z output jack on the rear panel. See the instruction sheet furnished with the WMT-1 transformer for complete installation directions.

## TAPE OR BOOSTER AMPLIFIER

To drive a booster amplifier or tape recorder, connect a patch cord (with a standard phono plug) from the TAPE/BOOSTER output jack to the input of the booster amplifier or tape recorder.

# CONTROL FUNCTIONS

## POWER SWITCH

The POWER switch on the front panel turns the amplifier ON and OFF.

## MICROPHONE 1

The MIC 1 control on the front panel is used to adjust the volume of the Microphone 1 input. It is turned clockwise (to the higher numbers) to increase the volume and counterclockwise to reduce it. Set the control to the zero position (indicated by a triangle) when the Microphone 1 input is not used.

## MICROPHONE 2

The MIC 2 control on the front panel is used to adjust the volume of the Microphone 2 input. It is turned clockwise (to the higher numbers) to increase the volume and counterclockwise to reduce it. Set the control to the zero position (indicated by a triangle) when the Microphone 2 input is not used.

## AUXILIARY

The AUX 1/AUX 2 control serves a two-fold purpose. It selects either of the two auxiliary inputs and it controls the volume of the selected auxiliary input. To select the AUX 1 input, rotate the control counterclockwise past the center position (indicated by a triangle between the two l's). Turning this control more counterclockwise increases the AUX 1 volume.

To select the AUX 2 input, rotate the control clockwise past the center position. Turn the control more clockwise to increase the AUX 2 volume. If the auxiliary input is not to be used, set the control to the center position.

The control can be also used as a "fader" control when both auxiliary inputs are connected. This makes it possible to gradually and smoothly reduce the level of one input and then increase the other when changing inputs. The effect is one of fading from one auxiliary input to the other.

## RESET MARKER

Each volume control has a red reset marker on the

skirt of the knob. This marker is used to log a particular setting. This is done as follows. Adjust the volume controls to the desired levels. Slide the reset markers to coincide with the midpoint mark on the front panel. The individual knob can now be returned to zero or any other point, allowing instant resetting to the predetermined level.

## MASTER

Rotate MASTER control to maximum clockwise. Set the MIC and AUX input volume controls to the highest level likely to be used, and then mix inputs as desired. Use the MASTER control to regulate the overall volume of the output signal.

## BASS

The BASS control is used to adjust the tonal balance of the amplifier output. The center position of the control (indicated by a triangle between the two l's) provides flat frequency response. Rotation of this control in the counterclockwise direction reduces (cuts) bass response of the amplifier. Clockwise rotation of the control increases bass response.

The BASS control may also be used to remove low-frequency noise such as phono rumble or hum. In situations where acoustic feedback (howling) is likely, rotate this control counterclockwise. This reduces the feedback effect and permits higher volume levels than would otherwise be possible.

## TREBLE

The TREBLE control adjusts the tonal balance of the amplifier output. The center position (indicated by a triangle between the two l's) provides flat frequency response and is generally used when program sources and speaker systems are of the highest quality. Rotation of the control in a counterclockwise direction reduces the high frequency response of the amplifier; clockwise rotation increases it. This control can also be used to remove high-frequency noise, such as record scratch.

# INSTALLATION AND OPERATING HINTS

## FEEDBACK

If speakers are located too close to the microphone, acoustic feedback (squealing or howling) may result. In this case, adjust the volume, and the BASS and TREBLE controls if necessary, to the point where feedback is eliminated. In addition, move the speakers to increase the distance between the speakers and microphone.

## HUM

A low-frequency hum may be heard if the connections between the signal sources and the amplifier are incorrect or defective. Recheck all connections for continuity if hum occurs. Try reversing the amplifier power plug and the plugs of other units such as the phono player connected in the system. Check

for broken wires, shields and poor connector contacts. Keep input cables away from the speaker cables. Keep speaker cables away from transformers and AC power lines. In the case of a phono player, it may be necessary to connect a separate ground wire from the chassis of the phono player to the GND on the rear of the amplifier.

## MICROPHONE TECHNIQUE

Speak directly into the microphone in a normal voice, at a distance of approximately 6 inches to one foot from the microphone.

Speak deliberately with even speed and loudness. Don't shout. Pause frequently between words and pronounce each word carefully. Sound final consonants. Do not sing-song or drop words here and there.

## BOGEN SERVICE

We are interested in your Bogen amplifier for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Communications, P.O. Box 500, Paramus, New Jersey 07652.

When communicating with us, give the model number and serial number of your unit. Completely describe the difficulty encountered and the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

When shipping your unit, pack the amplifier well, using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via railway express. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you via express collect.

## CIRCUIT BREAKER

The amplifier circuitry is protected against electrical overload by a  $1\frac{1}{4}$  ampere circuit breaker. To reset the breaker, press the red reset button, located on the top chassis left side, as shown in figure 2.

If the circuit breaker trips again, do not attempt

## REPLACEMENT PARTS

The components used in Bogen equipment, with exception of items listed below, are standard parts through all reputable parts jobbers. However, several parts are custom-made to strict Bogen specifications and should be replaced only with genuine Bogen parts. These custom-made parts are listed here and are available through Bogen distributors, service agencies or direct from the factory.

Ref. No.	Part No.	Description
c2, c3	79-008-034	Capacitor, Electrolytic, 25 mfd, 15V
Cl2	79-008-048	Capacitor, Electrolytic, 50 mfd, 25V
C18	79-005-039	Capacitor, Electrolytic, 1000 mfd, 15V
C19	79-008-036	Capacitor, Electrolytic, 50 mf d, 15V
Cl04	79-009-065	Capacitor, Electrolytic, 4000 mfd, 50V
C105, 106	79-009-053	Capacitor, Electrolytic, 2000 mfd; 40V
CB101	94-0008-02	Circuit Breaker, 2 Amp
CR1, CR2	96-5184-01	Diode, 200 PIV, 3 Amp
Q1, Q2	{ 96-5213-01	Transistor 2N5089
Q5, Q6	{ 96-5228-01	Transistor BC239C
Q3, Q4	96-5213-01	Transistor S2285
Q7	96-5131-01	Transistor 2N5089
Q101,	96-5162-04	Transistor 40234
Q102, Q103		Transistor 2N3055 (95V)

to operate the unit. Check the amplifier to determine the cause of the overload, or consult a Bogen representative or competent serviceman.

## TRANSISTOR REPLACEMENT

Transistors and semiconductor diodes do not ordinarily require routine testing. When the receiver does not perform properly and it is suspected that a transistor or diode is at fault, only a qualified technician should test them.

However, if previous tests by a technician indicate that a transistor might be faulty, it must be removed from the circuit for checking. The plug-in transistors, of course, can easily be replaced. When replacing plug-in transistors, use Dow Corning No. 340 Compound Silicon Grease (or equivalent). Brush compound on heat sink, insulator, and transistor. Be certain that no foreign matter is on heat sink, insulator, or transistor. To insure proper thermal contact, screw down plug-in transistors securely.

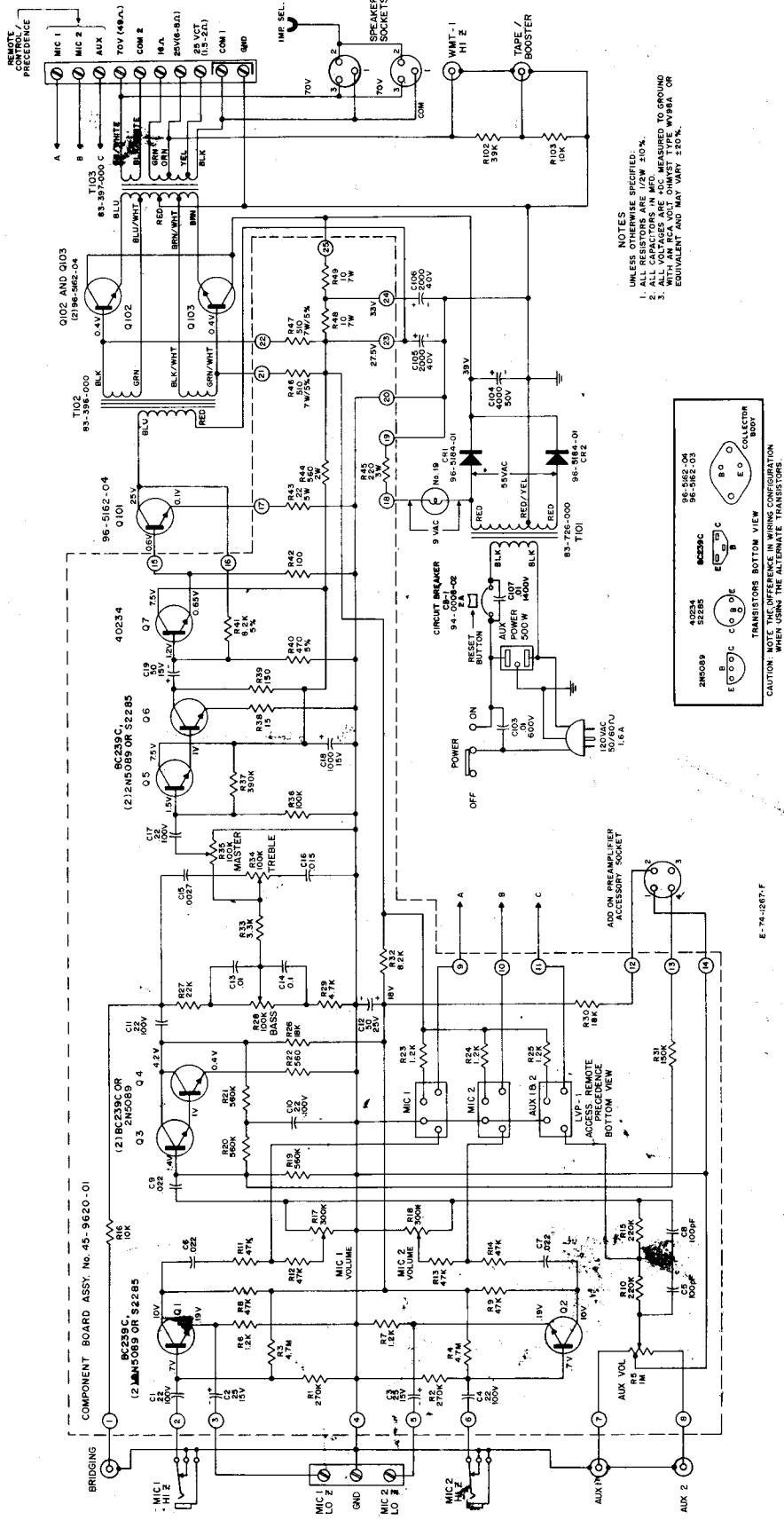
## PRINTED CIRCUIT REPAIR

When testing or replacing components on the printed circuit, take care not to damage the board by application of excessive heat or pressure. A 40-watt pencil iron normally is sufficient to unsolder component parts. If component leads are cut, always pull them through from the top of the board - never pull from the printed side. Do not insert the leads of replacement components into the board without first clearing the holes. This may be done by heating the solder and inserting a pick from the underside of the board.

## REPLACEMENT PARTS

When ordering a part, specify part number and description of the part as listed below. Specify the model and give the series designation, which is a run letter followed by numbers, stamped or screened on the rear of the chassis. Also, give the component board assembly number (45-) for all parts mounted on PC boards.

Ref. No.	Part No.	Description
R5	77-00 1-646	Control, AUX Volume (CT fader)
R17	77-001-649	Control, MIC 1 Volume
R18	77-00 1-649	Control, MIC 2 Volume
R28	77-00 1-647	Control, Bass (BD taper)
R34	77-001-648	Control, Treble (Audio taper)
R35	77-00 1-648	Control, Master Volume (Audio taper)
R43	76- 113-098	Resistor, $0.22\Omega$ , 5 watt
R44	75-412-56 1	Resistor, $560\Omega$ , 2 watt
R45	75-842-221	Resistor, $220\Omega$ , 3 watt
R46, R47	75-743-511	Resistor, $510\Omega$ , 7 watt
R48, R49	75-742-100	Resistor, $10\Omega$ , 7 watt
SW101	81-003-025	Switch, Power
TIO1	83-726-000	Transformer, Power
T102	83-396-000	Transformer, Driver
T103	83- 397-000	Transformer, Output
	94-0197-O 1	Bulb, No. 19
	85-0147-O 1	Plug, Speaker, 3-pin
	03-0594-01	Knob & Skirt (O-10)
	03-0595-01	Knob & Skirt (5-O-5)
	02-9029-01	Reset Marker



**Figure 4 – Schematic Diagram CHS100**

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